EXECUTIVE SUMMARY

Background

Under sections 608 and 609 of the Clean Air Act, the United States Environmental Protection Agency (U.S. EPA) established guidelines for the removal, recovery, and possible recycling of vehicle refrigerant, including HFC-134a, from End of Life Vehicles (ELVs). ELVs are vehicles that have or those vehicles that have reached the end of their drivable lives (US EPA 1). However, there has been no aggressive enforcement of these requirements. In order to improve the recovery rate of HFC-134a, a vehicle refrigerant used in 1995 and newer model years, the California Air Resources Board (CARB) has identified enforcement of these federal requirements as a possible greenhouse gas (GHG) reduction strategy, though little is known about the amount of refrigerant remaining in ELVs.

Methodology

This analysis estimates the amount of HFC-134a remaining in the ELV population of California from 2000 through 2008 as well the population from 2005 through 2007. We estimate the extended time frame from 2000 through 2008 in order to characterize the entire ELV population. We then look at the population from 2005 through 2007 to best estimate the potential benefit of increased regulation on the current and forecasted population of ELVs.

We define an ELV as a vehicle that has been issued a junk title or salvage certificate. Using data from the California Department of Motor Vehicles (CA DMV) and smog check records, vehicles with lapsed registration records were identified and investigated further to determine their CA DMV status. From this group, we estimated the number of ELVs and characterized them by CA DMV classification, smog check results, geographic location, and vehicle specific attributes. In order to quantify the amount of HFC-134a within this ELV population, 2,002 vehicles were sampled at vehicle dismantlers through out the state. The 30 participating vehicle dismantlers were licensed by the state of California and were members of the State of California Auto Dismantlers Association (SCADA).

Results

In order to estimate the population of ELVs, we identified 39,645,818 vehicles with lapsed registration status from 2000 through 2008. Of this total, 8,537,707, or 22%, were classified as ELVs. An additional 60% of vehicles were found to have non-ELV DMV status, and 6% went out of state. For the remaining 12% of vehicles with lapsed registration status, CA DMV has either lost track of the vehicle, no CA DMV records exist for the vehicle, or multiple registration histories exist for VIN. These 4,426,062 vehicles with lapsed registration status were excluded from the analysis due to lack of accurate data, reducing the precision of the analysis.

The 8.537.707 ELVs from 2000 through 2008 were owned by 2,107 different vehicle dismantlers in California as well as 487 non-dismantling and out of state businesses. Vehicle dismantlers operating without proper licenses as required by California Vehicle Code owned 1% of the ELV population from 2000 through 2008, while out of state dismantlers and non-dismantling businesses owned 19%. For the remaining 11% of ELVs, the last owner was a private individual or an entity that we were not able to identify.

In order to best encapsulate the current ELV population, we then focus on the ELV population from 2005 through 2007. This ELV population is comprised of 3,190,430 vehicles. These ELVs were owned by 1,629 vehicle dismantlers in California as well as 210 non-dismantling and out of state businesses. Licensed California dismantlers owned 79% of these ELVs, dismantlers without the proper licenses owned 1%, out of state and non-dismantler businesses owned 15%, and unidentified entities owned the remaining 5% of these vehicles. Data pertaining to vehicle ownership has dramatically improved in recent years, driving the differences in these results from the entire ELV population from 2000 through 2008.

Extrapolating the findings from the ELV population from 2005 through 2007, any regulation targeting recovery of HFC-134a from licensed California vehicle dismantlers will regulate 79% of the California ELV population. From 2005 through 2007, 1,020,938 ELVs were 1995 or newer model year vehicles, an average of 340,313 a year. As time passes the portion of ELVs containing HFC-134a continues to increase. From 2000 through 2008, the ELV population containing HFC-134a increased an average of 3% each year. From January of 2000 through December of 2008, the average percentage of ELVs containing HFC-134a increased from 9% to 44% of the total population. Thus. the population of ELVs containing HFC-134a and the potential benefit from increased enforcement of U.S. EPA regulations will continue to grow.

Across the sample of 2,002 vehicles, 1,966 vehicles had air conditioning systems utilizing HFC-134a. For these vehicles, the recovered HFC-134a varied widely with an average of 27% of the total HFC-134a capacity recovered. Thirty-six sampled vehicles contained the precursor to HFC-134a, R-12 that was phased out in 1994 model year vehicles. An average of 10% of refrigerant capacity was recovered from these vehicles, again with great variation by vehicle. Focusing the analysis on ELVs containing HFC-134a narrows the sample to 1,365 vehicles or 68% of the total. Vehicles containing HFC-134a and classified as an ELV had an average of 26% of their total refrigerant capacity recovered, however the recovered amounts varied widely and were not strongly correlated with vehicle or geographic specific characteristics. These vehicles had an average HFC-134a capacity of 853 grams and 220 grams were recovered on average. Pursuant to CARB's goal of improving HFC-134a recovery, extrapolating the sample findings to the ELV population, a maximum of 26% of total HFC-134a capacity or an average of 220 grams per vehicle could be recovered from ELVs on licensed dismantler lots in California.

Conclusions

From 2005 through 2007, an average of 340,313 ELVs containing HFC-134a were on vehicle dismantler lots in California each year. Across our sample of 1,966 ELVs containing HFC-134a, 26% of refrigerant capacity, or 220 grams, was recovered. Extrapolating the mean capacity and amount recovered from the sample to this population, we find that each year the ELV population contained 74,869 kg of HFC-134a. Licensed vehicle dismantlers in California owned 79% of the ELV population in 2007. Thus, on average there was 59,146 kg of HFC-134a remaining on in ELVs on licensed dismantler lots in California from 2005 through 2007. Based on this information, the maximum benefit of CARB increasing efforts to support U.S. EPA's regulation overseeing the removal and storage of HFC-134a from licensed California vehicle dismantlers was 59,146 kg a year in from 2005 through 2007.

The percentage of ELVs containing HFC-134a continues to grow approximately 3% a year. Thus, the maximum potential benefit to any increased enforcement of U.S. EPA regulations guiding the removal and storage of HFC-134a will increase. We project that by 2012 there will be 68,566 kg of HFC-134a in ELVs on licensed vehicle dismantler lots in California each year.